Ready reckoning

A recent ruling against Monsanto highlights the many ways that glyphosate has not only embedded itself within agriculture, but also tied agribusiness, science and politics together in unprecedented ways.

Last month Dewayne Johnson, a 46-year old school groundskeeper in northern California, USA, won a US\$289 million verdict in a civil lawsuit filed against agribusiness giant Monsanto, arguing that the company's weed-killing product Roundup was responsible for his terminal cancer. Johnson testified that he used to spend multiple hours a day in contact with the herbicide. Roundup contains glyphosate, which has been approved for use on over a hundred crops and in most countries since its introduction in 1974, although its use has become contentious (<http://bit.ly/2N1YfQ2>). The jury in the case awarded Johnson US\$39 million in compensatory damages for health care and lost productivity, but then added US\$250 million in punitive damages.

Monsanto's lawyers argued that over the forty years that Roundup has been on the market, hundreds of studies — conducted by independent academics along with the United States Environmental Protection Agency (EPA) and National Institutes of Health — have failed to find a link between glyphosate and cancer. This same argument was upheld in a concurrent trial in California, where the state government lost a lawsuit that tried to force Monsanto and other agribusinesses to label products containing glyphosate as potentially carcinogenic. The state already lists glyphosate as a 'known carcinogen' on the heels of a 2015 report from the World Health Organization's (WHO) International Agency for Research on Cancer (IARC) that reviewed numerous epidemiological studies. In that trial, the judge required the state of California to provide evidence that the warning about being carcinogenic was "purely factual and uncontroversial". The IARC's report has been dismissed by multiple regulatory and governmental agencies, including the European Union's (EU) chemical and food safety authorities and the EPA (<https://bloom.bg/2wcPewD>).

Meanwhile, as government agencies were reapproving glyphosate, judges in the United States were considering evidence in some 4,000 potential lawsuits filed by claimants alleging that Roundup, and its maker, are responsible for their cancer diagnoses. 450 lawsuits have so far been cleared to proceed, with plaintiffs using the studies cited by the IARC report as support. Those in the first batch, which includes Johnson's, all claim a

link between Roundup and non-Hodgkin lymphoma. Johnson's lawsuit hinged on the disclosure of documents from Monsanto executives that purport to show that the company was aware that glyphosate could be carcinogenic, and sought, through various means, to hide this risk by orchestrating PR campaigns against studies (including the IARC report) that may have found or suggested such a link.

However, the jury did not have to find that Roundup was the sole cause of Johnson's lymphoma in order to award compensatory damages, but simply that it was more likely than not to have contributed to his cancer; the additional punitive damages of US\$250 million required the jury to determine that Monsanto acted with 'malice' towards the public with its use of Roundup (<http://bit.ly/2BsbXdH>). The ruling not only got a swift rebuke from Monsanto and a promise to appeal, but also led farmers groups from Britain to Australia to react in dismay and accuse the jury's members of being 'ignorant' in regard to established science supporting use of the herbicide (<http://bit.ly/2LaEFzk>).

It is not a crime for a company to try to control its public relations image, nor is it novel for a company to sponsor or underwrite research in an attempt to paint its products in a favourable light, but for a jury to award nearly a third of a billion dollars in damages is a strong indication of the public's view of such behaviour. However, that award was made to a human being sitting in the same room as them, and under a relatively weak standard of legal and scientific scrutiny. Ninety miles away, the judge in the carcinogenic-labelling case sat between two banks of lawyers and, under a different evidentiary standard, made a superficially contradictory ruling. Meanwhile the IARC and EPA reports are being used to bludgeon supporters and opponents of glyphosate alike, depending on which science particular groups or individuals favour, coloured by who is providing funding and lobbying for that science. The EU, for example, remains bitterly divided over the herbicide, with Germany suddenly and at the last minute providing the key support for its reapproval last year while France and Italy have sworn to ban its use.

This is not a story that directly relates to plant biotechnology or genetic modification

of crops. However, a major driver of the use of glyphosate has been the development of resistant crops — 'Roundup Ready' soybeans, maize, cotton and others — making 'Roundup' and 'genetic modification' synonymous to many people. There is no question that Roundup Ready crops have led to an increase in yields over the past decades. There is also little doubt that Monsanto, and other companies that make glyphosate-based herbicides, have sought to exert financial and political influence over the agencies that regulate them. The EPA, WHO and other institutions must do better, not just in reviewing the evidence before them, but allowing for and compelling future research on the risks of these chemicals. The EU and USA have recently diverged when it comes to labelling and the practice of genetic editing for crops, but both must ensure that future regulatory decisions are made on the best available evidence. Any link between glyphosate and cancer is contentious and not yet proven, even Johnson's lawyers did not argue that glyphosate itself was the issue, but rather its interaction with other chemicals within Roundup's concoction. As a result, the on-going debate between academics and agencies should be welcomed, but only if conducted on a level playing field and used to further our understanding of the risks, not hide them.

Despite the massive companies, international agencies, and always-weighty issues of scientific responsibility and legal liability involved, we are still talking about individuals whose livelihoods and lives are at stake. The application of any scientific advance, be it a new chemical, a new way to improve crops or even a new algorithm to analyse our social media activity, must not proceed without the informed acquiescence of the people that it affects. Regardless of their scientific expertise, or lack thereof, it remains the role of a public jury to look not just at the evidence before them, but also at the life, and coming death, of a peer sitting right in front of them, and deliver a ruling that tries to do justice. We cannot ask them to do anything else. □

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